

CHRISTENSEN  
O'CONNOR  
JOHNSON  
KINDNESS PLLC

LAW OFFICES

PATENT, TRADEMARK AND OTHER  
INTELLECTUAL PROPERTY MATTERS1420 FIFTH AVENUE, SUITE 2800  
SEATTLE, WASHINGTON 98101-2347

TELEPHONE: 206.682.8100

FAX: 206.224.0779

INTERNET: [www.cojk.com](http://www.cojk.com)

## FACSIMILE COVER SHEET

DATE:

TO:

EXAMINER Don G 703-308-2876

FACSIMILE NO:

203-746-9395

RE:

OUR REFERENCE:

YOUR REFERENCE:

10/067-116

FROM:

SCOTT SHILBERG

(Facsimile No. 206.224.0779)

MESSAGE:

COPY OF PROPOSED  
AMD

\*\*\* The information contained in this facsimile message is privileged and confidential information intended only for the use of the recipient named above. If the reader of this message is not the intended recipient, or the employee or agent responsible to deliver it to the intended recipient, any distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone and return the original message to us at the above address by mail. \*\*\*

We have 4 pages to send, including this sheet. If any pages need to be retransmitted, please call 206.682.8100, Ext. 1722, within 15 minutes.

1. A high-power semiconductor device, comprising:
- a substrate having a cavity extending from at least one surface of the substrate,
- a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate, wherein the electron emitting coating is made of a low work function material;
- an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit;
- a grid forming at least one aperture configured for allowing the passage of electrons therethrough, wherein the grid is constructed of an electrically conductive material, and wherein the grid is positioned between the cathode and anode;
- a seal for creating a controlled environment in an area surrounding the anode, cathode, and grid; and
- a circuit configured for heating the cathode.
- 

Alternative Amendment to Claim 1, which has a more defined definition of a low work function material.

1. A high-power semiconductor device, comprising:
- a substrate having a cavity extending from at least one surface of the substrate;

a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate, wherein the grid is made of material selected from the group consisting of BaSrCa tricarboxate, BaSr, BaSrAl, thoriated tungsten, scandia, scandate and cesium;

an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit;

a grid forming at least one aperture configured for allowing the passage of electrons therethrough, wherein the grid is constructed of an electrically conductive material, and wherein the grid is positioned between the cathode and anode;

a seal for creating a controlled environment in an area surrounding the anode, cathode, and grid; and

a circuit configured for heating the cathode.

-----

Applicant also notes that the structure of the device, having a cavity (160) etched into the substrate, i.e., "a cavity extending from at least one surface of the substrate," provides for improved heat dissipation of the cathode (113). See figure 1 attached. This structure of a cavity directly etched directly into a substrate is not disclosed or suggested in the cited references.